

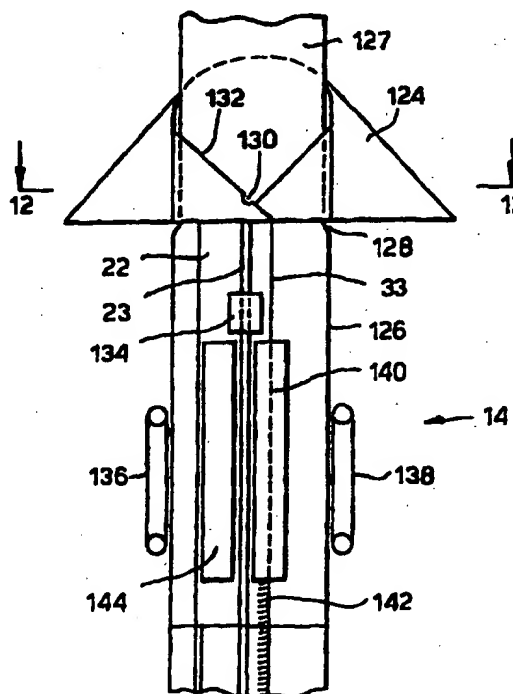


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(54) Title: MANUFACTURE OF RECLOSABLE FILLED BAGS**(57) Abstract**

In a form-fill machine an enlarged gap (125) between a forming collar (124) and the filling tube (126) permits a web (34) of bag material to be passed through the forming collar with a blind header (22) including a resealable fastening strip (23) folded flat against it. The header remains flat against the web (34) until lifted from it after emerging from the collar. A filled reclosable bag having a single transverse seam adjacent a fastening strip can be produced by presenting a web having a pre-folded edge or edges to the form-fill machine.



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MANUFACTURE OF RECLOSABLE FILLED BAGS

This invention relates to reclosable bags, eg. of plastics material, filled with product by means of a form-fill machine, and to a method of and machine for manufacturing such bags.

Reclosable plastics bags have a fastener strip consisting of two inter-engaging profiles, one attached to each wall of the bag. Consumers prefer that the fastening strip is across the top of the bag so that the contents, eg. frozen peas, may easily be poured from the bag. It also is necessary however that the bag is closed in a tamper-proof manner when first filled, and that it remains so until opened by the consumer. To reconcile these conflicting requirements, it is necessary to provide a blind header across the top of the bag which is cut off when the bag is first opened. However, the provision of such a header causes difficulties in the process of forming the bags on a vertical form-fill machine. One solution as disclosed in US 4.625.496 is to hold the header away from the remainder of the web from which the bag is formed as it passes through the form-fill machine. This method has the disadvantage that the forming collar, already a difficult component to fabricate, is made further complicated by the need to provide a longitudinal aperture throughout its length to permit the passage of the header, in addition to the aperture customarily provided for the edges of the web which are to be sealed together when the web is formed into a tube.

Other form-fill methods, eg. US 4.993.212, which utilise web with a pre-attached closure strip, only produce bags in which there is no header.

In both of these known methods the web material is drawn tightly around the forming tube as it passes through a narrow gap between the tube and the collar, and the header including its fastening strip are positively guided through the collar.

Due to the limitations of known apparatus it is a characteristic of known reclosable bags with a header that there is a fin seam extending across the bag parallel to but remote from the fastening strip, either at the bottom of the bag or across a face of the bag. In one aspect the present invention repositions this seam. A bag of improved appearance results, and (compared to a bag with a

seam across its face) a greater proportion of the surface is available for printed matter.

Thus, in one aspect the invention provides a filled plastics bag having a blind (ie. closed) folded header, a reclosable fastening strip bounding the header, and a single transverse seam across the bag adjacent the fastening strip.

Preferably the seam is a lapped (overlapping) seam.

Alternatively, one of the two portions of bag material forming the seam is folded so that corresponding surfaces of the web are adhered to each other.

This is advantageous if the web material is laminated from two or more layers of different material; like materials may thereby be adhered together.

A tear strip may be incorporated within the header, to facilitate opening thereof.

Alternatively or in addition there may be at least one line of perforations or other line of weakness in the header to facilitate opening thereof.

It will be appreciated that the fastening strip may have mechanically engaging parts or may employ another method by which the two halves of the strip join together eg. by adhesion. The term "conforming parts" and "engage" as used in the specification and claims are thus to be given a broad interpretation to apply to any pair of fastening strip portions which detachably join together.

In a second aspect the invention provides a method of producing reclosable filled bags on a form-fill machine comprising folding a web of bag material adjacent an edge thereof to form a closed header bounded by a reclosable fastening strip affixed to opposing faces of the folded web, passing the web over a forming collar and around the form-fill tube of the form-fill machine, joining opposing edges of the web together to form a tube having a seam adjacent and parallel to the fastening strip, and fashioning the tubular web into a succession of bags filled with product.

According to a third aspect of the invention (which may be combined with the second aspect) there is provided a method of producing reclosable filled bags on a form-fill machine comprising affixing a reclosable fastening strip to opposing faces of a web of bag material, so as to form a header which will become a top portion of bags formed from the web, passing the web over a forming collar and

around the form-fill tube of the form-fill machine, joining opposing edges of the web together to form a tube, and fashioning the tubular web into a succession of bags filled with product, the header being accommodated in a gap between the collar and the form-fill tube such that the header lies flat against the web.

Then the web is not tightly constrained between the form-fill tube and the collar. The result is that, unlike in known methods, the web is relatively unstressed and this together with the relatively large gap between the collar and the form-fill tube allows the header to lay flat (i.e. circumferentially) on the web without being folded back upon itself, the fastening strip if necessary rotating about its longitudinal axis to permit this.

Unless the context otherwise requires the term header as used herein includes also the fastening strip.

Preferably the header is unguided as it passes between the collar and the form-fill tube, thereby making use of our surprising discovery that contrary to prior teaching, it is better not to guide or constrain the header as it passes through the collar. Better results are achieved if the flat and unfolded header is allowed to find its own route, and guided if necessary as it passes over the form-fill tube after it has emerged from the collar.

Accommodation of the header may be achieved by enlarging the gap between the collar and the form-fill tube, eg generally by increasing the diameter of the collar, or preferably by decreasing the diameter of the form-fill tube compared to its lower region, or locally by providing a flat on the circumference of the form-fill tube or by providing a broad recess in the collar.

Preferably the header being maintained flat against the web until it is lifted therefrom for the formation of a side seam between successive bags.

The web may be presented to the forming collar with the header folded flat against the web.

The header may be formed by locally folding the web without folding the remainder of the web.

The local folding may be effected and then the fastening strip may be introduced into the fold.

A tear strip may be affixed to the web within the fold eg. along the fold line,

before or after the fold is formed.

In a further aspect the invention provides a machine for producing reclosable filled bags comprising means for folding a web of bag material adjacent an edge thereof and for fixing a reclosable fastening strip to the web so as to be within the fold whereby the fold forms a closed header bounded by the fastening strip, a form-fill tube for delivering product, a forming collar around an upper part of the form-fill tube for receiving the web, means for drawing the web over the collar and around the form-fill tube, means for joining opposing edges of the web together to form a tube having a seam adjacent and parallel to the fastening strip, and means for fashioning the tubular web into a succession of bags filled with product.

In yet another aspect (combinable with the last-mentioned aspect) the invention provides a form-fill machine for providing reclosable filled bags by means of the method of the third aspect, comprising a form-fill tube for delivering product, a forming collar around an upper part of the form-fill tube for receiving the web, means for drawing the web over the collar and around the form-fill tube, and means for joining opposing edges of the web together to form a tube, means for fashioning bags from the tubular web, the machine comprising a gap between the forming collar and the form-fill tube through which the header strip passes, the gap being sufficient to accommodate the header so that the header lays flat against the web whilst passing between the collar and the form-fill tube.

There may be means for maintaining the header flat against the web whilst it passes over the form-fill tube.

Preferably a portion of the form-fill tube which is surrounded by the collar is of smaller perimeter than the portion thereof where the joining means is located, so as to define the gap between the collar and the form-fill tube through which the web passes with the header disposed flat against the web.

The form-fill tube may increase in perimeter where the web exits from between the collar and the tube.

The gap between the collar and the form-fill tube may be of uniform annular section, or the perimeter of the form-fill tube is shaped to provide a locally-enlarged gap with the forming collar to accommodate the header.

There may be a local groove in the top edge of the collar to accommodate the fastening strip, an external surface of the collar being arranged to deliver the web to said gap with the header flat against the web.

By accommodating the fastening strip the groove further relieves stress on the web as it passes over the forming collar.

There may be means for folding the header flat against the web before it arrives at the collar.

The method may comprise maintaining the header flat against the form-fill tube throughout the length thereof. Then, after the web has been formed into a tube, the header may be lifted from the web.

The head may be lifted from the web by means of a jet of air or other gas.

The means for maintaining the header flat against the tube may be alongside the means for joining the opposing edges of the web together.

The fastening strip may pass between the maintaining means and the joining means.

The invention will now be described merely by way of example with reference to the accompanying drawings, wherein:

Figure 1 shows a reclosable filled bag according to the invention;

Figure 2 is a view on line 2-2 of figure 1;

Figure 3 shows a variant of the bag of figure 1;

Figure 4 shows a stage in the manufacture of the bag;

Figure 5 shows part of the closure strip thereof;

Figures 6 to 10 show further stages in the manufacture of the bag;

Figure 11 shows a form-fill machine according to the invention;

Figure 12 is a view on line 12-12 of figure 11;

Figure 13 is an enlarged view of the part of figure 12;

Figure 14 is a view on arrow 14 of figure 11;

Figure 15 is a view similar to figure 12 of an alternative embodiment of the invention;

Figure 16 shows a forming collar of that embodiment;

Figure 17 shows part of the form-fill tube of that embodiment; and

Figure 18 is a section on line 18-18 of figure 17.

Referring to Figures 1 and 2, a resealable form-filled bag comprises a front 10 and back 12 resulting from forming a single web of thermoplastics material around the tube of a vertical form-fill machine. Side seams 16, 18 are formed in the cross-machine direction as successive bags are filled with product 20 and parted-off.

Before being presented to the form-fill machine the web is folded to form a blind header or closed top portion 22 below which conforming or otherwise engaging or adherent parts 24, 26 of a fastening strip 23 are heat sealed (welded) to the opposing inner faces of the bag. Whilst the header 22 is intact the bag remains sealed and tamper-evident. To gain access to the contents the header is cut or torn off; a tear strip 27 is provided to facilitate this.

Thereafter the bag can be re-closed by means of the fastening strip 23.

The bag has a single welded lapped transverse seam 21 on the main body of the bag just below the fastening strip 23. The seam is formed as described hereafter and results in the bag being of improved appearance with both faces of the bag being available for printing.

The thickness of the fastening strip 23 is too great to be reliably sealed as part of the side seams 16, 18. Therefore it is necessary to compress and fuse the two parts 24, 26 of the closure strip together locally at bag-width intervals in a separate operation before the web is presented to the forming tube of the form-fill machine. The web is then fed through the form-fill machine such that when the filled bags are cross-seamed and parted each locally fused area is cut into two parts 28, 30 so that an effective seal is provided at the ends of the closure strip of each bag.

Figure 3 shows an alternative form of the bag of figures 1 and 2.

In this case the web is of laminated material, and one edge of the web is folded at 32 to present a surface of like material to the other edge 33 for welding as the seam 21. It will be appreciated that like materials are also face to face within the folded portion 32, so that weld integrity is achieved through the thickness of the lapped seam.

Figure 4 shows the blind header of the bag of figure 1 during manufacture. A web 34 of thermoplastic material is folded near (e.g. about 50mm from) one of

its edges 33 to form the folded blind header 22. The closure strip 23 is located about 25mm from the top of the header, and the tear strip (in this case a bead) 27 is heat sealed along the fold line. The header has two lines of perforations 38 so that the bag embodying the header can easily be opened by pulling the tear strip.

The bead 27 was manufactured integrally with one of the conforming parts 24, 26 of the closure strip 23, and was separated therefrom as described hereafter. Figure 5 shows the one half 27 of the closure strip with the bead 27 attached thereto by a thin web 39, the whole having been produced as a single extrusion.

Manufacture of the bag of figure 1 will now be described.

The closure strip 23 with its conforming parts assembled together and attached bead 27 are supplied on a convenient single reel 71, Figure 6. The strip is dispensed from the reel as required by the header-forming machine and passes over a tensioning roller 70 to a parting knife 72 (Figure 7) which separates the bead 27 by slitting the thin web 39. The separated bead and the closure profile then pass through separate profiled nips of a pair of rollers 74, and are fed to the subsequent stations of the machine as shown in Figure 8 and in more detail in Figure 9.

Referring first to Figure 8, the web 34 is unwound from a supply reel 76, passes through a folding section 78 and thence to zip insertion and heat-sealing station 80.

Referring to Figure 9, the parted bead 27 is fed via a dancer roll 82 and turnover 84 to a heat-sealing station 86 where it is welded to the web 34 along the line at which the web is to be folded to form the header. The web passes over a roller 87 where it is pierced by toothed wheels 88 to form the perforation lines 38 one each side of the bead 27.

The web passes under a spreader or smoothing bar 90 and its edge 33 is folded over on to the web to form the header 22.

Folding is achieved at the folding station 78 by depressing the web at the fold line by a knuckle portion 92 of a serpentine bar to provide an upstanding portion of web 94, then passing the upstanding portion of the web beneath an

angled portion 96 of the bar which folds it against the main body of the web. The smoothing bar permits lateral movement of the web to permit its depression by the knuckle 92.

As an alternative to the knuckle portion, the web may be depressed by a roller the end of which lies along the fold line. The upstanding web portion 94 is then folded flat by a separate bar equivalent to the portion 96 of the serpentine bar.

If the web is of laminated material, the other edge 32 (figure 9) is also folded by a serpentine bar as in figure 9 or other folding device so as to provide presentation of like-to-like surfaces for welding, as discussed with reference to figure 3. The fold at edge 32 need be no bigger (say 10mm to 20mm) than is dictated by the need to achieve a reliable fold.

The folded web then passes over a further roller 98 to the zipper insertion station 80. Here, the fastening strip is introduced into the header fold by passing it over a pulley wheel 56, and the folded web then passes between heated jaws 58 (known per se, figure 8) whereby the conforming part of the fastening strip are welded to the opposite internal surfaces of the fold.

The web then passes to an ultrasonic sealing station (Figure 9) in which the header portion 22 with the fastening strip therein is passed through sealing jaws 60, 62. These jaws locally compress and fuse the conforming parts of the closure strip together at bag width intervals whilst the web 34 is continuously moving.

One of the jaws 60 is rotatably mounted and driven by a servomotor 61 the speed of which is controlled by a sensor (not shown) which measures the speed of the web. The jaw has an anvil portion 64 with an arcuate surface centred on the axis of rotation of the jaw. This surface defines with the other jaw 62 a closely-toleranced gap to compress the fastening strip 23. The other jaw 62 is constructed as an ultrasonic horn, having a conventional ultrasonic generator 63 eg. as supplied by Kerry Ultrasonics Inc, but is mounted in a novel manner.

It is pivotally mounted for angular oscillation about an axis parallel to the axis of rotation of the jaw 60, and is driven intermittently so that the end 65 of jaw 62 is presented to the anvil 64 upon each rotation of the jaw 62. In a prototype version of the invention a follower 66 on the jaw 62 is intermittently engaged by

a camming surface on the jaw 60 to drive the jaw 62 in synchronism therewith. Upon disengagement of the follower 66 the jaw 62 is returned by the action of a spring. In a production version of the device a more sophisticated drive eg. a stepper motor may be employed to drive the jaw 62 or alternatively the jaw 62 could be another rotary jaw similar to jaw 60 and driven by the same servo motor 61.

Each time the jaws 60, 62 are aligned the ultrasonic generator 63 is activated, heating the portion of header 22 and fastening strip 23 then between them. The two halves of the fastening strip thus are compressed and fused together. Because the circumferential velocity of the anvil 64 is matched to the linear speed of the web, and the velocity of the end 65 of the jaw 62 is matched to that of anvil 64 there is no relative motion in the web direction between the operative surfaces of the jaws and the moving web during the compressing and fusing operation. That is to say the jaws roll on the web. When the anvil 64 departs from the web there is sufficient clearance for the jaw 62 to return to its starting position whilst the web continues to move. Thus intermittent fusing of the fastening strip 23 is achieved at bag width intervals whilst the web is continuously moving.

The web 34 with its folded edge or edges is now conducted to the forming collar of a form-fill machine for conversion into bags and filling with product.

The web 34 passes over the forming collar 124 of the machine (Figure 11) and around the form-fill tube 126. The upper part 127 of the tube 126 and the collar 124 define an annular gap 125 (figure 12) which is much larger than in known machines, for example about 2mm or more wide, compared to less than 1mm in known machines. Beneath the collar the tube 126 increases in diameter at 128 to the conventional size for the bag to be produced. The web is drawn around this part of the tube relatively so as to adopt a close fitting tubular form as customary in known machines.

Because the diameter of the portion 128 of the tube defines the quantity of web material which is gathered by the collar to form the tubular bag, the web is relatively loose within the gap 125, and is accommodated to arrange itself so that the header 122 lays flat (circumferentially) on the adjacent web, as shown in

Figure 12, and enlarged in Figure 13. If the fastener portion 23 of the header is not already flat against the web there is sufficient space for it to rotate (clockwise as seen in Figure 13) about its longitudinal axis to permit this. Because the web is only a loose fit around the upper part 127 of form-fill tube 126 there is no tendency for the header to rotate and stand up from the web under the influence of the circumferential tension in the web whilst it is drawn around the tube.

The collar is formed from sheet metal eg. stainless steel, and has edges which overlap to provide a longitudinal slot 129 to assist in fitting the web 34 around the filling tube 127 during commissioning of the machine. The slot is approximately tangential to the gap 125. The edge 33 of the web may thus conveniently be allowed to protrude through the slot.

A notch 130 (Figure 11) is provided in the upper edge or shoulder 132 of the forming collar 124 to accommodate the fastener strip as it passes over the shoulder. The notch does not extend down the inner surface of the collar, thereby leaving the wall of the collar smooth and so as not to obstruct lateral movement of the fastener. Because of the large gap 125, the provision of the customary wear-resistant liner on the surface of the part 127 of the tube 126 may be omitted.

As an alternative to reducing the diameter of the tube 126, a flat may be provided on its circumference adjacent the notch and extending downwards over the tube at least until it emerges from the collar. The flat should be of sufficient circumferential extent that the enlarged gap thereby produced with the collar is sufficient to accommodate the header flat against the web. A further alternative is to enlarge the collar, either by increasing its diameter relative to the tube, or by providing a wide recess (wider than the guide groove of US 4993212) in which the header as a whole can be received.

The web is drawn over the tube 128 by a pair of oppositely-disposed drive belts 136, 138 (figures 11, 14).

As the web passes over the enlarged portion 28 of the form-fill tube, the fastener passes through a guide 134 so that it is correctly aligned relative to the cross-seaming device of the machine. The guide 34 comprises a block having a grooved surface positioned close to but spaced from the surface of the tube 128

so that the web may pass therebetween with the fastener 23 received in the groove. The fastener is thereby located in the correct position on the tube for subsequent manufacturing stages as described hereafter. The header 122 is held flat against the web by means of a plate 144 adjacent a sealing device 40. The plate is spaced from the tube 128 sufficiently for the web and header 22 to pass through the gap thereby defined without dragging but also without the header 22 lifting from the web. The guide 134 can if derived be combined with the plate 144 by providing a groove in the plate to engage the fastening strip 23.

The sealing device 140, known per se, and provided with a non-stick (eg. TEFLON®) surface heats the overlapping edges 32, 33 of the web 34 and produces a lapped welded seam 142 longitudinally of the non-tubular web.

Beneath the base of the form-fill tube 26 the now-tubular web is spread by three cooperating spreading devices, as shown in Figure 14. An internal spreader bar 146 is pivotally mounted at 148 and is angularly reciprocated by a pneumatic cylinder 150. Diametrically opposite the spreader 148 is a fixed internal spreader 152, arranged to bear upon the web where the fastener strip 23 is fixed. A reciprocating external gripper 154 is aligned with the spreader bar 152, and is provided with openable and closable jaws. Such a gripper is described in more detail in our earlier specification WO96/11138.

In operation, during each cycle of the machine, when the tubular web 34 has been cross-seamed (as at 160) and advanced by one bag-width, the spreader 146 is operated to pull the tubular web against the spreader 152. This flattens the tube and by putting it in circumferential tension causes the header 22 to stand away from the web. The upstanding header then is grasped by the gripper 154 and the web is pulled further between the gripper and the spreader 146 so that it is flat and wrinkle-free. The bag is then filled, advanced by one bag width and cross-seamed by a conventional heat sealing and perforating device 162 which produces two parallel cross-seams 160 with a line of perforations 164 between them so that the bags may be separated.

Optionally, an air jet 165 is provided to assist the header to stand away from the web. The air jet is operated simultaneously with the spreader 146 to provide a short blast of air which penetrates between the web and the header so

as to lift the header. The gripper 154 then operates to grasp the header. The spreader 146, air jet 165 and gripper 154 all can conveniently be operated from a single compressed air supply. A second air jet may be provided on the other side of the header so that two converging jets of air are provided between which the header is held away from the web.

It will be appreciated that many variations of the disclosed embodiments are possible within the scope of the claims. For example, a filled bag according to the invention may be produced without the use of the novel form-fill machine herein described; a machine with a conventional collar and web-guiding arrangement may be employed instead.

Also, the concept of maintaining the header flat against the web may be employed in the manufacture of a conventional bag having a closed header and a seam remote from the fastening strip eg. a fin seal at the bottom of the bag or across one face thereof.

Figure 15 is a section similar to figure 12 through a forming collar and filling tube, this time configured to provide a fin seal 21A. The apparatus is as above, except for the following differences. Like parts carry the same reference numerals.

A radial slot 129A in the forming collar accommodates the upstanding edges of the web which will subsequently be welded together to provide the fin seal.

Referring to figure 16, the notch 130 is now disposed opposite to the slot 129A, instead of adjacent it as in figure 12.

The web is passed through the gap 125 between the collar and the filling tube as already described except that the draw down apparatus comprises an asymmetric set of drive belts.

These consist of a pair of adjacent rubber belts 136A, 138A (Figures 17 and 18) between which the edges of the web pass to sealing jaws (not shown) in which the fin seal 21A is formed, and a single rubber belt 139 offset from a position diametrically opposite to the belts 136A, 138A and adjacent the header-restraining plate 144. The belts are spring-loaded towards the form-fill tube 128 so as frictionally to engage the web material and draw it downwards.

As the web passes over the enlarged portion 126 of the form-fill tube, the fastener passes through the grooved guide 134 and then between the belt 139 and the plate 144.

If preferred the header may be lifted from the web by the guide 134 rather than maintained flat against it whilst travelling over the lower part of the tube. For this purpose, the grooved guide block 134 is modified so that its groove accommodates the complete header 22, instead of just the fastening strip 24, 26. The header is lifted from the tubular web 23 by the guide 34 so as to project radially away from it.

The single drive belt 139 and guide 144 of figures 17 and 18 then are replaced by a pair of parallel belts driven by pulleys and which bear upon and fictionally engage the web 32 as it passes over the filling tube 126. The belts have a narrow gap between them through which the upstanding header 22 including the fastening strip passes freely, ie. without being acted upon by the belts as described in our earlier specification WO96/1113, to which the reader is referred. If preferred, the belts 136A, 138A can be replaced by a single draw-down belt adjacent the fin seal.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

The texts of the applications from which this application claims priority (certified copies of which are filed with this specification) are incorporated herein by reference as if recited in full.

The text of the abstract filed herewith is repeated here as part of the specification.

In a form-fill machine an enlarged gap between a forming collar and the filling tube permits a web of bag material to be passed through the forming collar with a blind header including a resealable fastening strip folded flat against it. The header remains flat against the web until lifted from it after emerging from the collar.

A filled reclosable bag having a single transverse seam adjacent a fastening strip can be produced by presenting a web having a pre-folded edge or edges to the form-fill machine.

CLAIMS:

1. A filled plastics bag having a folded closed header, a reclosable fastening strip bounding the header, and a single transverse seam across the bag adjacent the fastening strip.
2. A bags as claimed in claim 1 wherein one of the two portions of bag material forming the seam is folded so that corresponding surfaces of the web are adhered to each other.
3. A bag as claimed in any preceding claim comprising a tear strip and/or at least one line of perforations or other line of weakness in the header to facilitate opening thereof.
4. A method of producing reclosable filled bags on a form-fill machine comprising folding a web of bag material adjacent an edge thereof to form a blind header bounded by a reclosable fastening strip affixed to opposing faces of the folded web, passing the web over a forming collar and around the form-fill tube of the form-fill machine, joining opposing edges of the web together to form a tube having a seam adjacent and parallel to the fastening strip, and fashioning the tubular web into a succession of bags filled with product.
5. A method as claimed in claim 4, the header being accommodated in a gap between the collar and the form-fill tube such that the header lies flat against the web whilst passing through said gap.
6. A method of producing reclosable filled bags on a form-fill machine comprising affixing a reclosable fastening strip to opposing faces of a web of bag material, so as to form a header which will become a top portion of bags formed from the web, passing the web over a forming collar and around the form-fill tube of the form-fill machine, joining opposing edges of the web together to form a tube, and fashioning the tubular web into a succession of bags filled with product,

the header being accommodated in a gap between the collar and the form-fill tube such that the header lies flat against the web whilst passing through said gap.

7. A method as claimed in claim 5 or 6, the header being maintained flat against the web until it is lifted therefrom for the formation of a side seam between successive bags.

8. A method as claimed in claim 5, 6 or 7, wherein the header is unguided as it passes between the collar and the form-fill tube.

9. A method as claimed in any of claims 4 to 8 comprising presenting the web to the forming collar with the header folded flat against the web.

10. A method as claimed in any of claims 4 to 9 comprising forming the header by locally folding the web without folding the remainder of the web.

11. A method as claimed in claim 10 comprising effecting the local folding and then introducing the fastening strip into the fold.

12. A method as claimed in claim 10 or 11 comprising affixing a tear strip to the web within the fold.

13. A method as claimed in claim 10 or 11 comprising fixing a tear strip to the web before it is folded.

14. A method as claimed in claim 12 or 13 comprising affixing the tear strip along the fold line.

15. Apparatus for producing reclosable filled bags by means of the method of claim 4 comprising means for folding a web of bag material adjacent an edge thereof and for fixing a reclosable fastening strip to the web so as to be within the fold whereby the fold forms a closed header bounded by the fastening strip, a

form-fill tube for delivering product, a forming collar around an upper part of the form-fill tube for receiving the web, means for drawing the web over the collar and around the form-fill tube, means for joining opposing edges of the web together to form a tube having a seam adjacent and parallel to the fastening strip, and means for fashioning the tubular web into a succession of bags filled with product.

16. A machine as claimed in claim 15 comprising a gap between the forming collar and the form-fill tube through which the header passes, the gap being such as to accommodate the header so that the header lays flat against the web whilst passing between the collar and the form-fill tube.

17. A form-fill machine for providing reclosable filled bags by means of the method of Claim 6, comprising a form-fill tube for delivering product, a forming collar around an upper part of the form-fill tube for receiving the web, means for drawing the web over the collar and around the form-fill tube, means for joining opposing edges of the web together to form a tube, means for fashioning bags from the tubular web, the machine comprising a gap between the forming collar and the form-fill tube through which the header passes, the gap being such as to accommodate the header so that the header lays flat against the web whilst passing between the collar and the form-fill tube.

18. A machine as claimed in claim 16 or 17 wherein the header passes through the gap without being guided.

19. A machine as claimed in claim 16, 17 or 18 means for maintaining the header flat against the web whilst it passes over the form-fill tube.

20. A machine as claimed in claim 16, 17, 18 or 19 wherein a portion of the form-fill tube which is surrounded by the collar is of smaller perimeter than the portion thereof where the joining means is located, so as to define a gap between the collar and the form-fill tube through which the web passes with the header disposed flat against the web.

21. A machine as claimed in claim 20, wherein the form-fill tube increases in perimeter where the web exits from between the collar and the tube.

22. A machine as claimed in any of claims 16 to 21 wherein the collar comprises a local groove in its top edge to accommodate the fastening strip, the collar being arranged to deliver the web to said gap with the header flat against the web.

23. A machine as claimed in claim 16 or claim 17, wherein the perimeter of the form-fill tube is shaped to provide a locally-enlarged gap with the forming collar to accommodate the header.

24. A machine as claimed in any of claims 15 to 23 comprising means for folding the header flat against the web before it arrives at the collar.

25. A machine as claimed in any of claims 15 to 24 comprising means for forming the header by locally folding the web without folding the remainder of the web.

26. A machine as claimed in claim 25 comprising means for effecting the local folding, and means for introducing the fastening strip into the fold.

27. A machine as claimed in claim 25 or 26 comprising means for affixing a tear strip to the web of the fold.

28. A machine as claimed in claim 25 or 26 comprising means for fixing a tear strip to the web before it is folded.

29. A machine as claimed in claim 19 or any claim dependent therefrom wherein the means for maintaining the header flat against the tube is alongside the means for joining the opposing edges of the web together.

30. A machine as claimed in claim 29 wherein the fastening strip passes between the maintaining means and the joining means.

Fig.1.

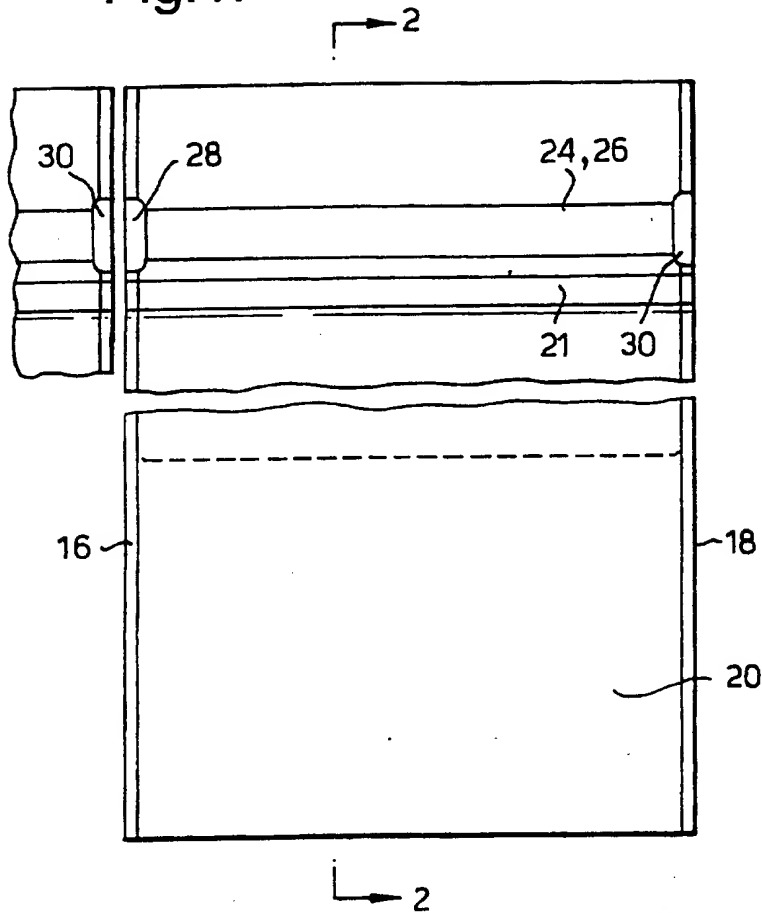


Fig.2.

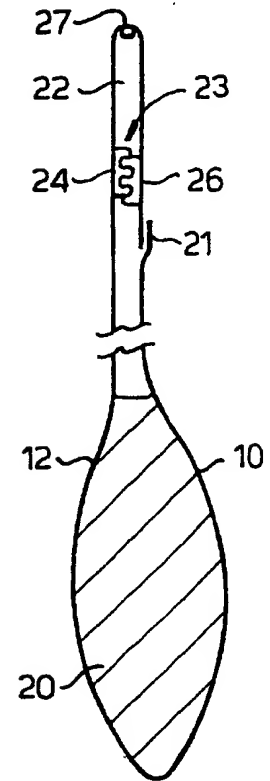
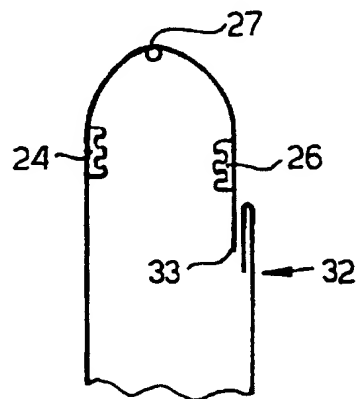


Fig.3.



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Fig.4.

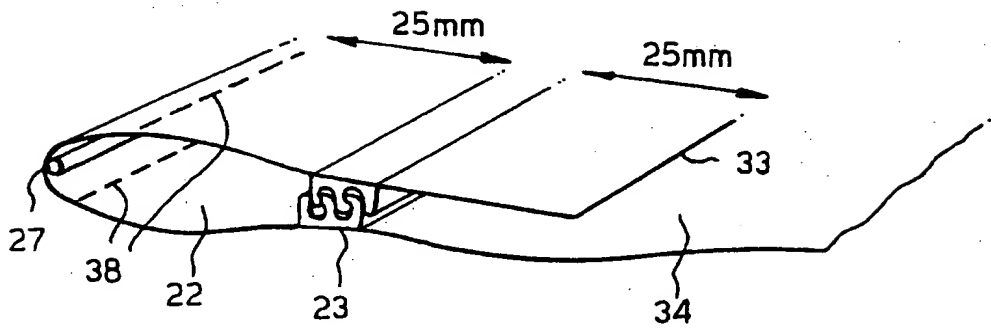


Fig.5.

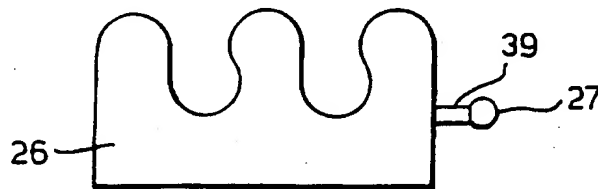


Fig.6.

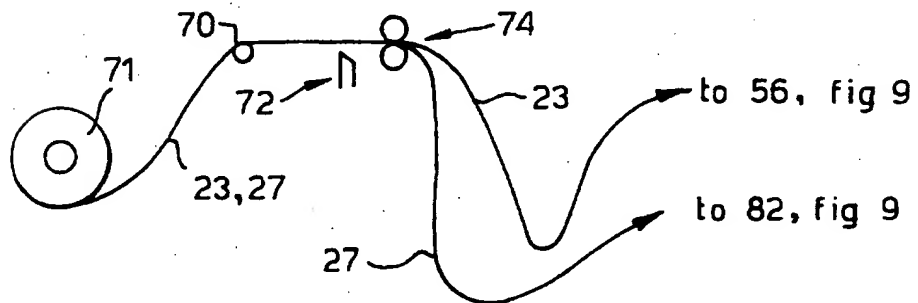
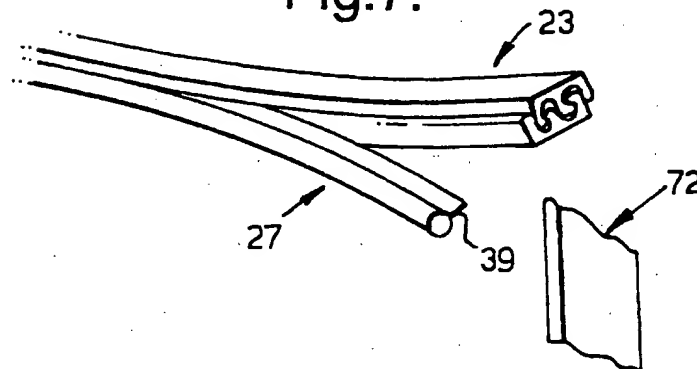


Fig.7.



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Fig.8.

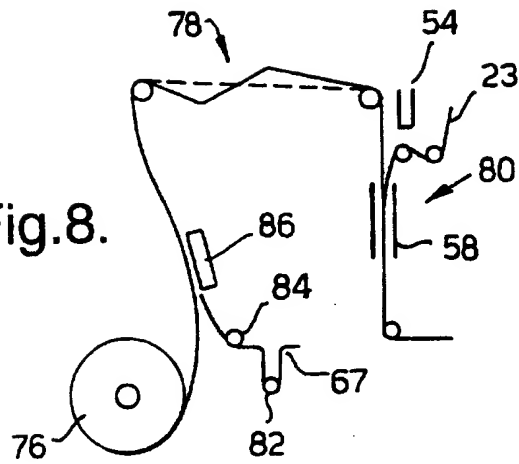
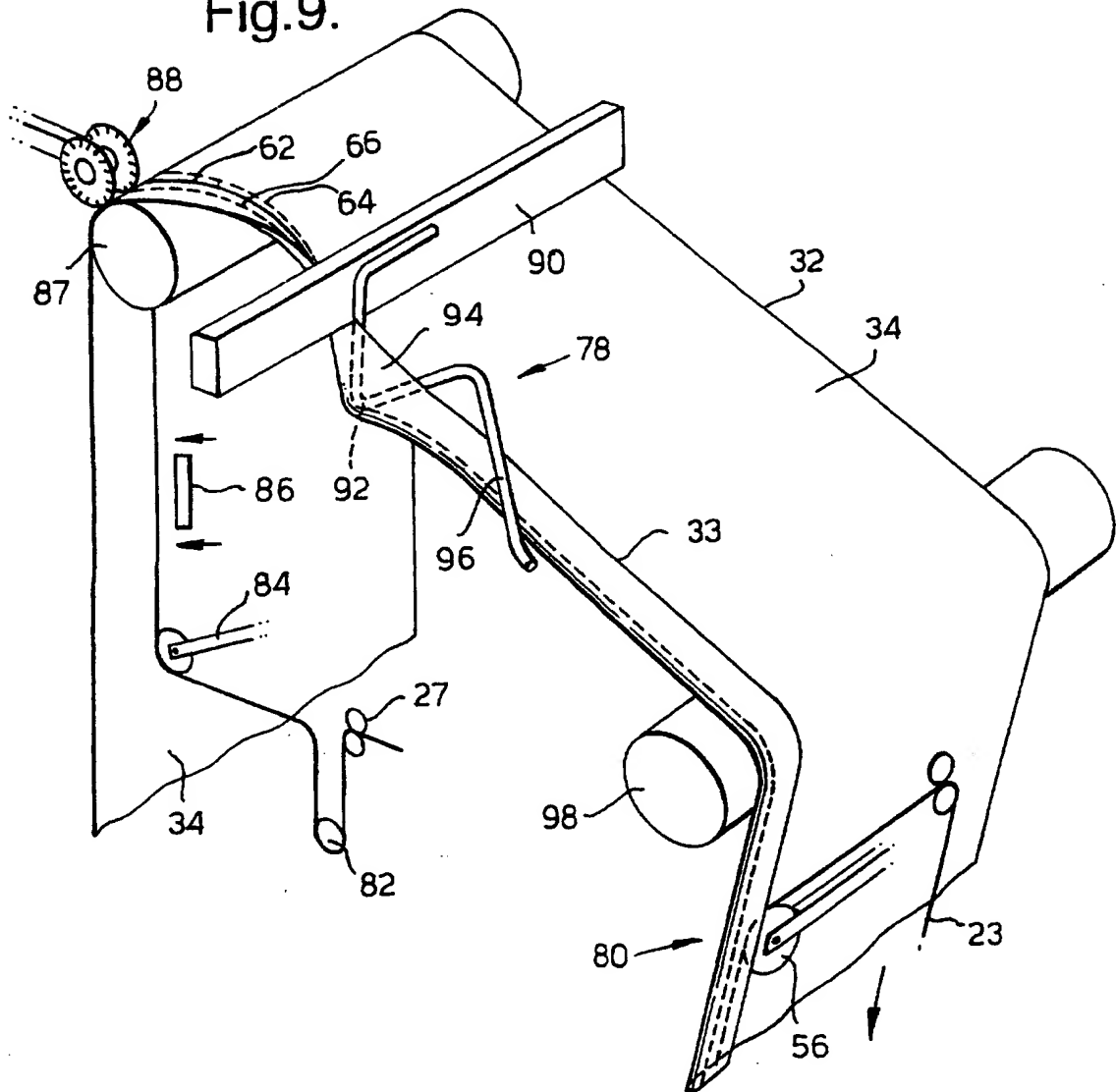


Fig.9.



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Fig.10.

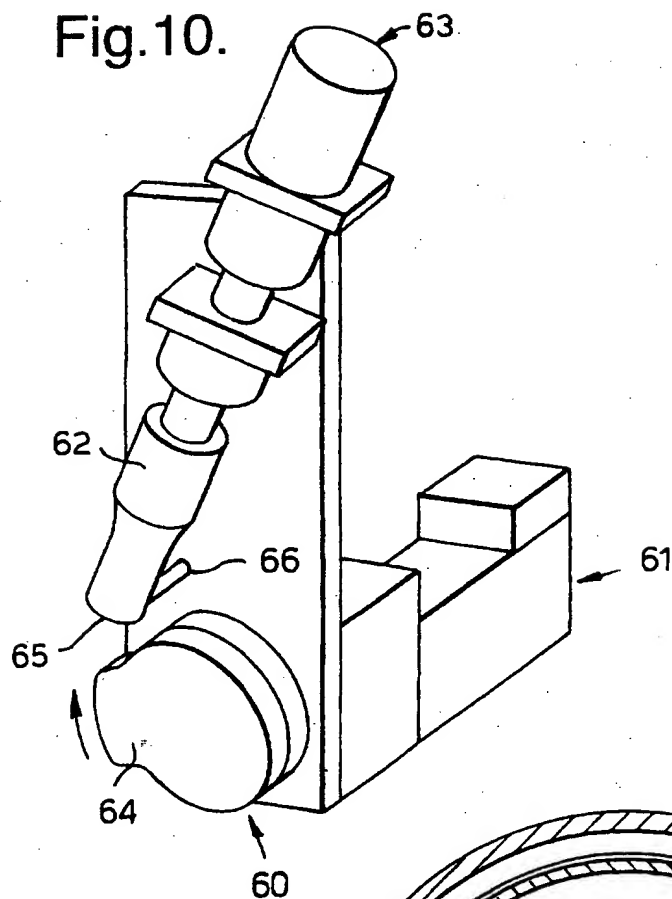
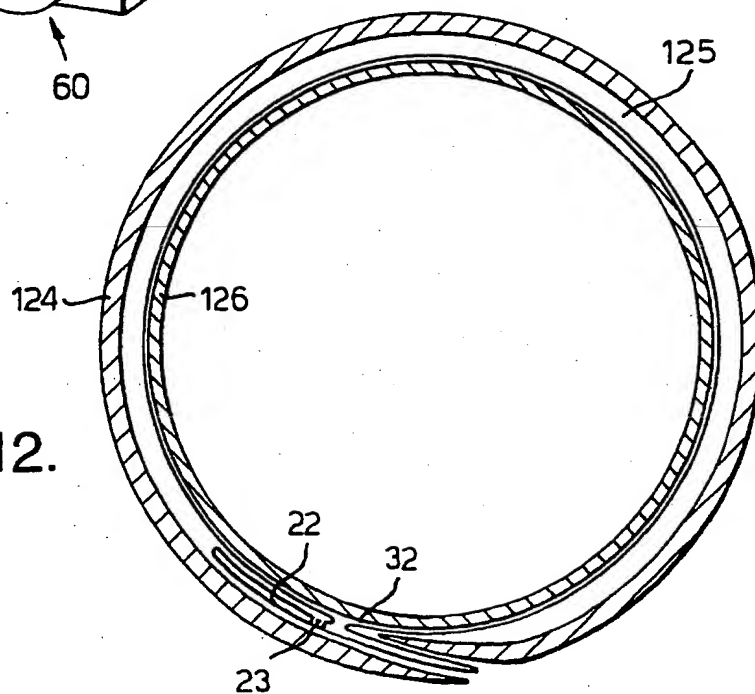


Fig.12.



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Fig.11.

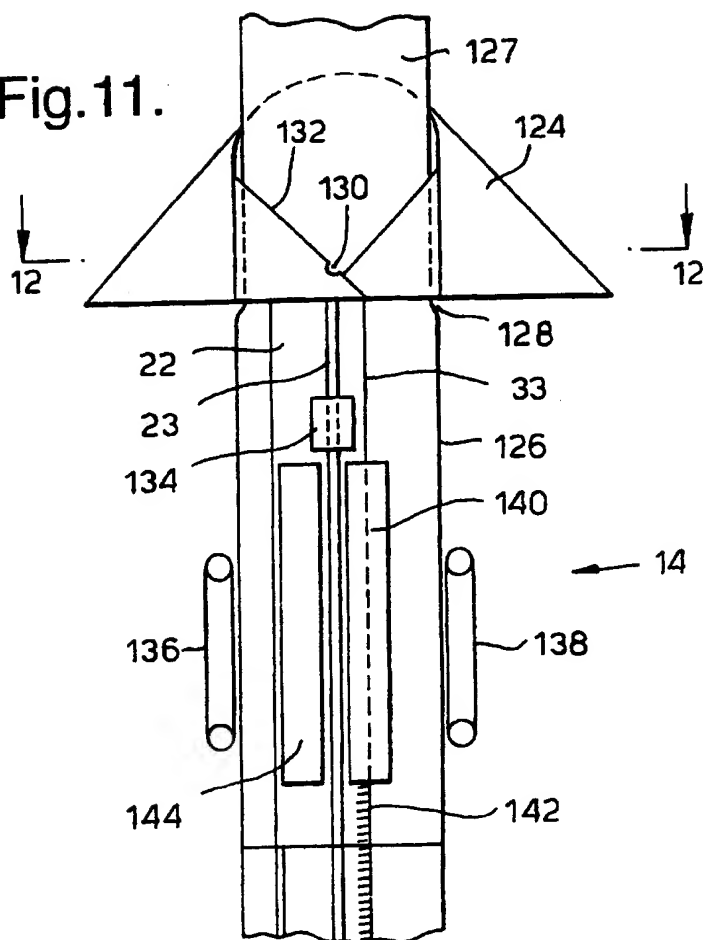
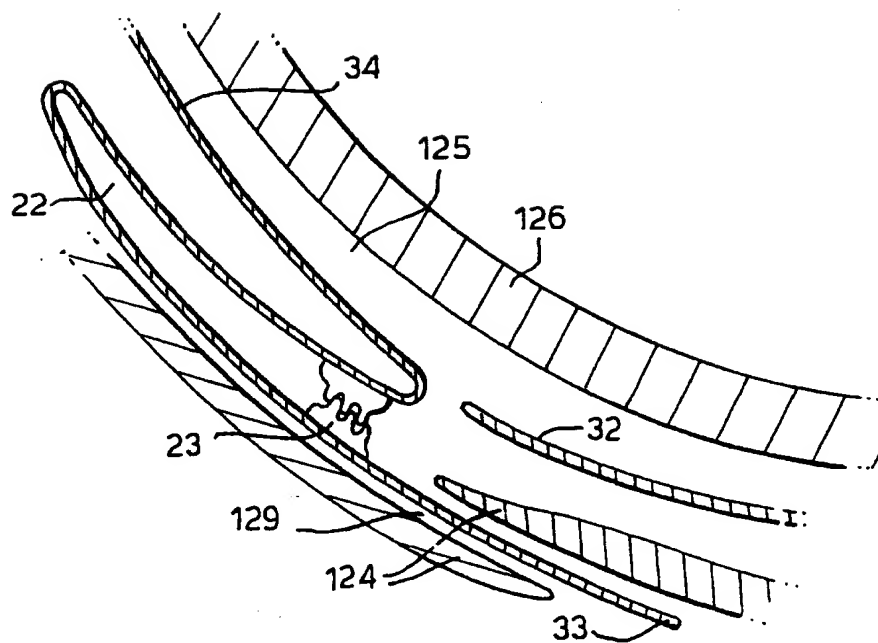


Fig.13.



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Fig.14.

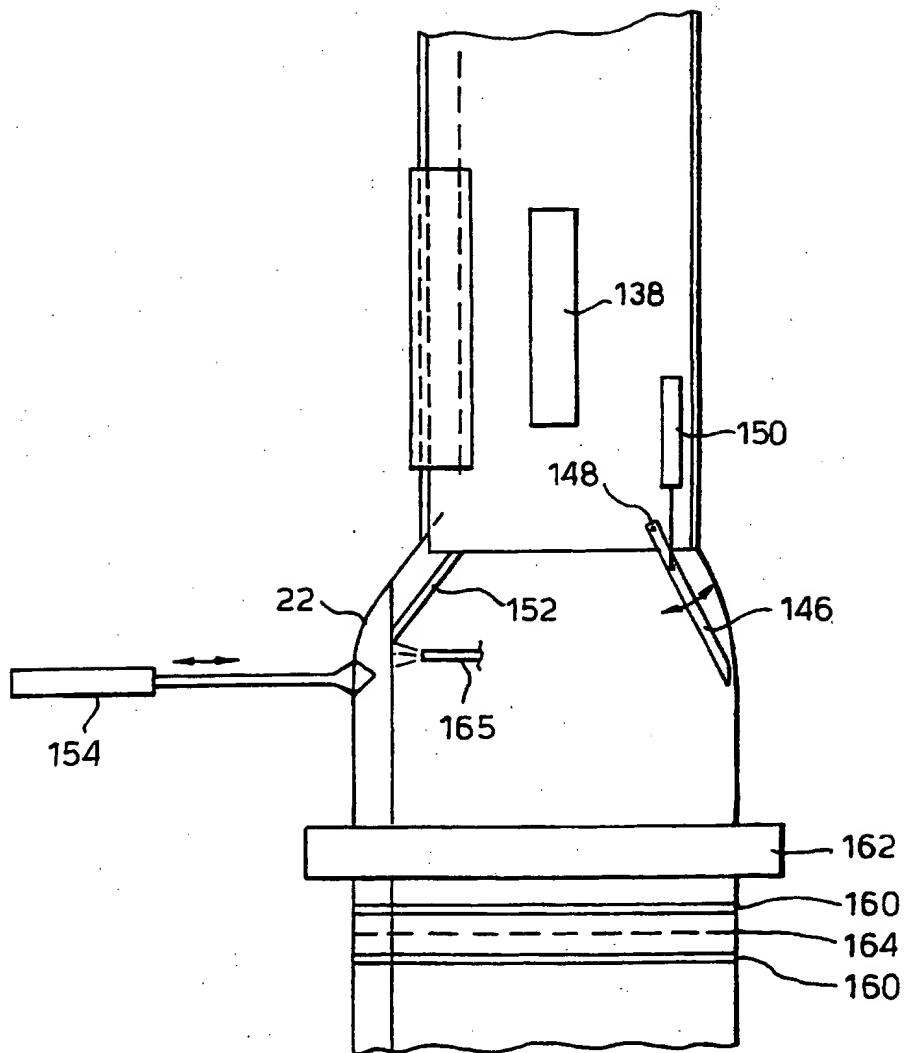


Fig.15.

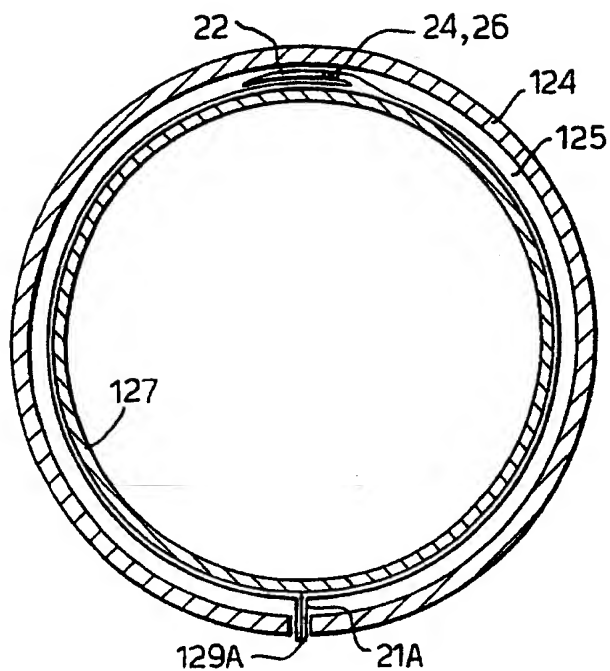


Fig.16.

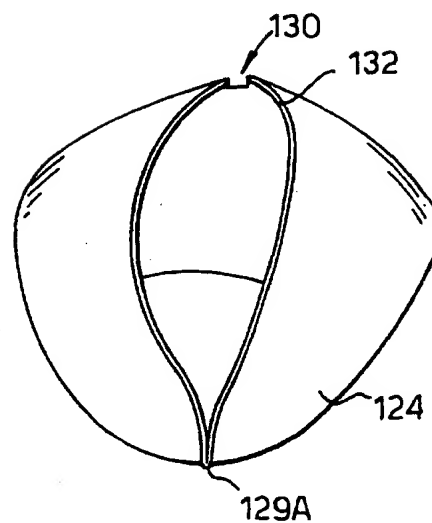


Fig.17.

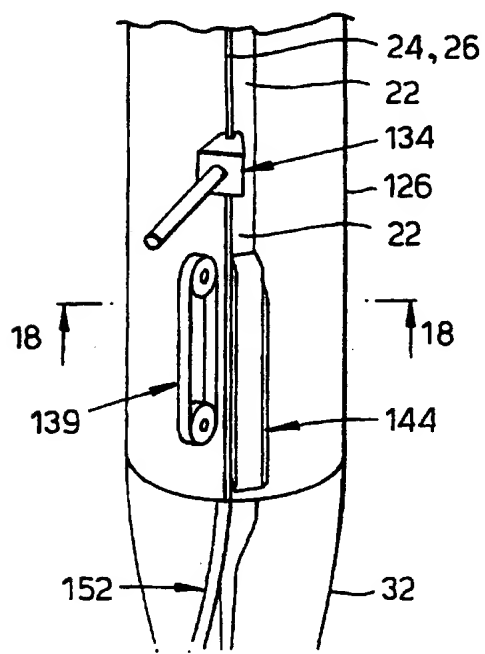
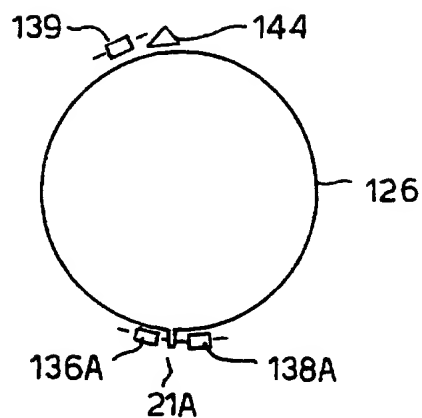


Fig.18.



INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 97/02303

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65B9/20 B31B19/90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65B B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|----------------------------|
| X | EP 0 276 554 A (NIHON TOKKYO KANRI COMPANY) 3 August 1988 | 1, 2, 4, 15 |
| Y | see column 3, line 12 - column 4, line 19; figures 1-13 | 3 |
| X | US 4 993 212 A (S. VEDOUKAS) 19 February 1991 | 4-6, 10, 15-17, 19, 20, 23 |
| Y | cited in the application see column 2, line 26 - column 3, line 23; figures | 12, 14 |
| Y | EP 0 481 783 A (REYNOLDS CONSUMER PRODUCTS) 22 April 1992 | 3, 12, 14 |
| A | see column 22, line 10 - column 27, line 55; figures 1, 8 | 27 |
| A | US 5 042 224 A (M. MCMAHON) 27 August 1991 | |
| -/- | | |

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☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

26 November 1997

Date of mailing of the international search report

04/12/1997

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

Jagusiak, A

INTERNATIONAL SEARCH REPORT

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PCT/GB 97/02303

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
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| A | US 3 838 549 A (C. PEPMEIER) 1 October 1974 ----- | |

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International Application No

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